

WIRELESS POWER-TRANSMITTING APPARATUS AND METHOD OF CONTROLLING THE SAME

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of Korean Patent Application No. 10-2015-0144271, filed on Oct. 15, 2015 in the Korean Intellectual Property Office, the entire disclosure of which is incorporated herein by reference for all purposes.

BACKGROUND

[0002] 1. Field

[0003] The following description relates to a wireless power-transmitting apparatus and a method of controlling the same.

[0004] 2. Description of Related Art

[0005] Recently, technology for wirelessly charging an electronic apparatus even in a non-contact state has been applied in various fields.

[0006] Thus, as the wireless power charging technology has been applied in various fields, various settings in accordance with characteristics of a wireless power-receiving apparatus are required for wireless charging.

[0007] However, normally, it is necessary to use a specific type of wireless power-transmitting apparatus specialized for a specific type of wireless power-receiving apparatus.

SUMMARY

[0008] This Summary is provided to introduce a selection of concepts in a simplified form that are further described below in the Detailed Description. This Summary is not intended to identify key features or essential features of the claimed subject matter, nor is it intended to be used as an aid in determining the scope of the claimed subject matter.

[0009] According to a general aspect, a wireless power-transmitting apparatus, includes a variable resonator; a power transmitter configured to wirelessly transmit power to a wireless power-receiving apparatus using the variable resonator; and a controller configured to determine class information of the wireless power-receiving apparatus and, in response, control the power transmitter to change impedance of the variable resonator according to the class information.

[0010] The class information may include an indication of at least one of a plurality of classes classified according to at least one of a type, required power, and impedance information of the wireless power-receiving apparatus.

[0011] The controller may be further configured to control the power transmitter to transmit a ping signal when a change in impedance of the variable resonator is detected, and to determine the class information from a response signal of the wireless power-receiving apparatus to the ping signal.

[0012] The variable resonator may include a variable capacitor; the power transmitter may include an inverter including switches connected to the variable resonator; and a capacitance controller configured to control capacitance of the variable capacitor.

[0013] The capacitance controller may be configured to control the capacitance according to a control signal provided by the controller.

[0014] The variable capacitor may include capacitors connected in parallel; and switches, each of which may be connected to at least a portion of the capacitors in series.

[0015] The class information may be represented by N bits, wherein N is a natural number greater than 0, and the variable capacitor includes N capacitors connected in parallel.

[0016] The controller may provide the class information to the capacitance controller as the control signal.

[0017] According to another general aspect, a method of controlling a wireless power-transmitting apparatus includes actuating a wireless power transmitter to transmit a ping signal; receiving a response signal of a wireless power-receiving apparatus to the ping signal, and identifying class information of the wireless power-receiving apparatus from the response signal; and changing impedance of a variable resonator of the wireless power transmitter in response to the identified class information.

[0018] The identifying of the class information may include obtaining the class information in a reserved location of a configuration packet included in the response signal.

[0019] The class information may correspond to a lower four bits included in a second block of the configuration packet.

[0020] The changing of the impedance of the variable resonator may include determining a first impedance corresponding to the identified class information; and changing the capacitance of the variable resonator to be substantially equivalent with the first impedance.

[0021] The changing of the impedance of the variable resonator may include determining values of a plurality of bits corresponding to the identified class information; and using the plurality of bits as a control signal for a corresponding plurality of switches included in the variable resonator.

[0022] The method may further include wirelessly supplying power by magnetically coupling the variable resonator having the changed impedance with a resonator of the wireless power-receiving apparatus.

[0023] According to another general aspect, a wireless power-receiving apparatus, includes: a resonator; a power receiver configured to wirelessly receive a wireless power radiation from a wireless power-transmitter apparatus using the resonator; and a controller configured to communicate a class information of the wireless power-receiving apparatus to the wireless power-transmitter apparatus to control the power transmitter to change an impedance according to the class information.

[0024] The controller may be configured to modulate a received wireless power radiation to communicate the class of the wireless power-receiving apparatus to the wireless power-transmitter apparatus.

[0025] The wireless power-transmitting apparatus may further include a short-range wireless communication circuit configured to receive an indication of class information of the wireless power-receiving apparatus.

[0026] The wireless power-receiving apparatus may further include a short-range wireless communication circuit configured to transmit an indication of class information of the wireless power-receiving apparatus to the wireless power transmitter apparatus.